

## THREE BATESIAN MIMIC OF MYRMARACHNE AT INDORE ( M.P.)

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### ABSTRACT

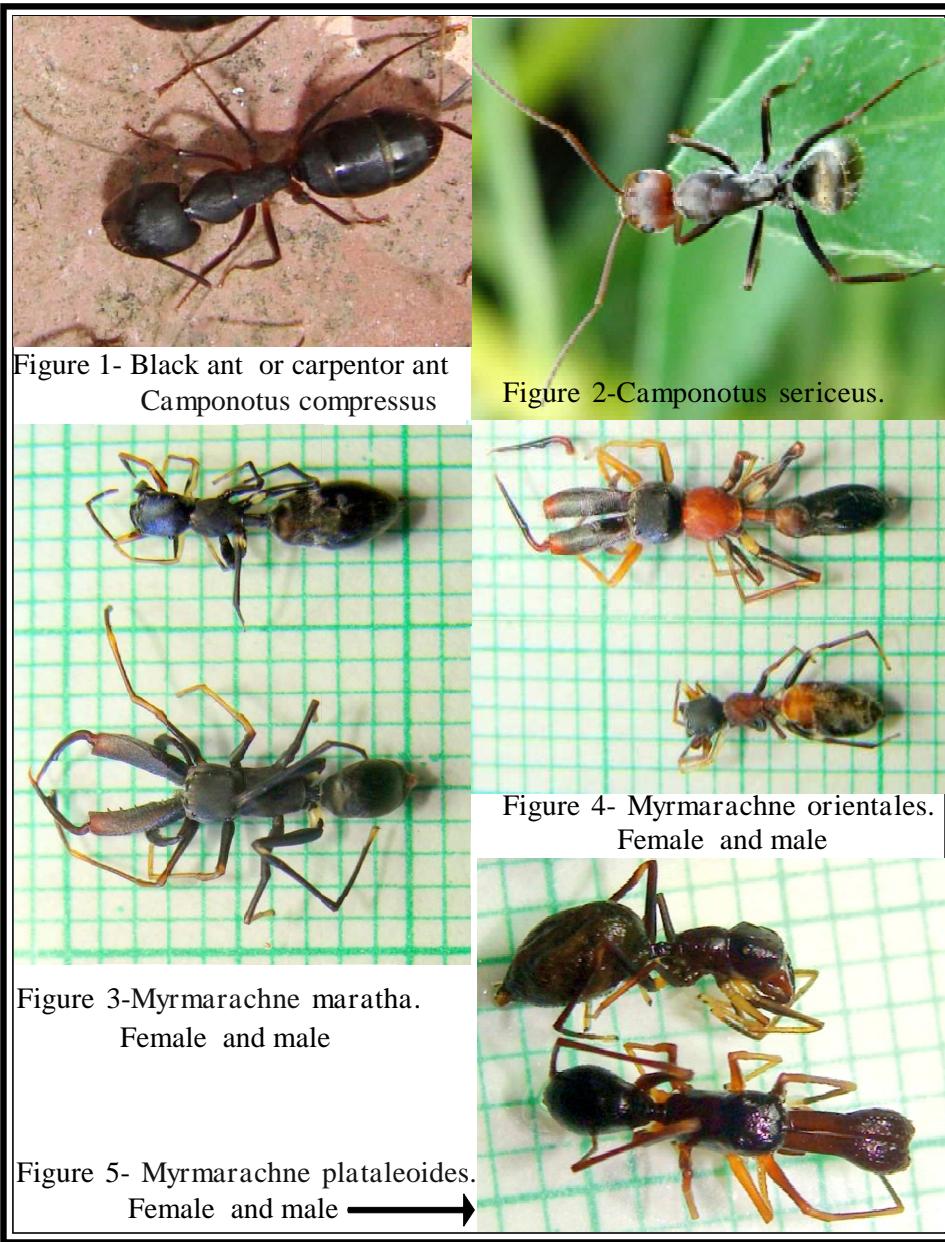
Genus Myrmachne of family salticidae shows structural and behavioral resemblance with ants. Myrmecomorphy in spiders show Batesian mimicry. The majority of the models are found in the same microhabitat as the mimics. Batesian mimics gain protection from predators by resembling unpalatable or dangerous model organism, misinforming predator by providing signals normally associated with the model. Myrmachne are sexually dimorphic, males are always larger than females and have enlarged chelicerae. Three different species of Myrmachne genus were collected from the area dominated by carpenter ants (*Camponotus compressus*) from Sirpur Tank, Indore (Madhya Pradesh). Especially female of all the species showed striking morphological similarity with that of model. On the other hand males are found to show poly morphism. All the three male can be distinguished very easily with the prominent chelicerae found in males. All the three species were diurnal and rely heavily on visual signals to avoid encounter with the model ant.

**Key words:** - Myrmachne, salticidae, Batesian mimicry.

### INTRODUCTION

Many genera of Spider (Salticidae) have been evolved in close association with ants. Such spiders are called ant like spiders. Genus Myrmachne of family Salticidae shows close morphological and behavioral resemblance to ants conferring strong survival advantages against predators. Some species of spiders have become integrated into the ant society, others keep closeness without being part of the ant society. Myrmecomorphy in spiders show Batesian mimicry. Over the years some genera of harmless salticidae have evolved to imitate the warning signals of a harmful ant to predator. Ants are found in large numbers in the tropical area of the world. Powerful mandibles, production of formic acid and poisonous sting make ants formidable animals with which no one would like to fight (Olldobler and Wilson, 1990). But mimicking ants give many animal advantages for survival. Batesian mimic gains the same advantage, without having to go to the expense of arming themselves. In a given area, the number model to which mimic is getting advantage must be high. The model, on the other hand, is disadvantaged and treated as harmless if the mimic does not show perfect resemblance model. Additionally, in higher frequency there is a stronger selective advantage for the predator to distinguish mimic from model. For this reason, mimics are usually less numerous than models. Mimics can still confer protection against predators even when they are more abundant than the model if model is very noxious, mimic has low nutritional value, abundance of food for predators (Cushing, 2012). However, some mimetic

Three Batesian mimic of.....Sharma, V.K.



**Table-1,** Collection data for ants and Myrmachne from Sirpur tank

Collection Station	Average no . of all species (Model)	No of species of ants	Average No of Mymarachne	Dominant species of Myrmachne	Polymorphism (mimic)	Threatening gestures
Sirpur tank	174	7	6	M.orientales M.Maratha M.plataleoides	High degree	yes

populations have evolved multiple forms mimicking multiple species of ants found in the habitat. This strategy provides them better protection.

In the present study three genera of Myrmarachne namely- *Myrmarachne orientales*, *Myrmarachne maratha* and *Myrmarachne plataleoides* were studied in the field to get an idea of their density as compared to ants. The interactional behavior of model- mimic and prey-mimic was also studied.

#### MATERIALS AND METHODS

**Study Sites:** The study site was a perennial water body, Sirpur tank ( $22^{\circ}70'08.21''N$ ;  $75^{\circ}81'35.56''E$ ) situated at outskirts of Indore ( $22^{\circ}44' N$ ,  $75^{\circ}50' E$ ) city.

**Study animals:** At Sirpur tank five sites having higher density of black ant (model) was selected. At these sites *Myrmarachne* (mimic) were identified. The studies were carried out from July 2010 to February 2012.

#### Survey Methodology:

Collecting methods mostly included bimonthly active searches at five sites. 10 x 10 meter quadrates from every study site. Detailed account on the locality, habit and habitat, date of observations, and photographs of the specimen were recorded. The specimens were photographed and released at the same location. Identification of the *Myrmarachne* was done using illustration and description as provided by Pocock (1900a) and Tikader (1972a).

#### RESULTS

Water is found round the year at Sirpur tank. Field near the tank is lush-green having wild variety of naturally occurring vegetation and associated fauna. Average of total number of ant and *Myrmarachne* at five palaces per station was calculated.

Data collected from Sirpur tank showed that biodiversity of ants and *Myrmarachne* was distinctly high. At Sirpur tank average of 174 ants were found in five 10x10 meter quadrates. Seven species of ants out of which *Camponotus compressus*, *Camponotus sericeus* and *Oecophylla smaragdina* were most common at all sites in close association with three species of *Myrmarachne* namely - *M. orientales*, *M. Maratha* and *M. plataleoides*. All the adult male *Myrmarachne* were found to have noticeable variation.

#### DISCUSSION

There are about 2,000 species of animals on earth that mimic ants. This data explains itself that ant mimic, bodily resemblances (myrmecomorphs) to ants are found everywhere. The advantages of becoming an ant are so big that some insects in their life cycle mimic ants during younger wingless nymph stages. Developmental plan of spiders offers resistance in resemblance to ant. Spiders

have four pair of legs against three pairs in insects, the body is divisible into cephalothorax and abdomen against head thorax and abdomen in insects. Ant-mimetic spiders have thus evolved many ways to look perfectly similar to ants by showing three parts in body segments, eye like pigmentation, first walking leg in the form of antennae, dark-colored body etc. Sometimes the mimicry is so perfect that female myrmachne cannot be identified without a closer observation. Population size of myrmecophiles is often quite low within a colony, but this depends on the type of myrmecophile (Cushing, 2012). In the present study average of 6 Myrmachne was reported between 174 ant populations. Spider myrmecophiles that have been studied in any depth, in general, tend to have small populations within a colony (Witte et. al., 1999, 2008 and Cushing, 1998).

Seven species of ant species were found at the study station Sirpur tank but, none of the Myrmachne was perfect mimic of ant. At all the five sites of the station female Myrmachne were observed to have a closer resemblance as compared to males. Myrmachne males resemble carpenter ants considerably less convincingly than Myrmachne females and juveniles. Identification of a male mimic by prey was easier by the presence of large chelicerae (Ceccarelli, 2010). With the large chelicerae the males can be easily spotted in the field and might be predated. This might be the reason for recording less number of male as compared to females at study stations. It is presumed that attacks of potential prey at Sirpur tank make Myrmachne to show threatening gestures by spreading chelicerae by males and sudden forward movement by female mimic. Such threatening gestures were found to be more useful when mimic finds them surrounded by models. Polymorphic mimics (Borges et. al., 2007; Nelson, 2010) that do not resemble any particular ant species especially closely may gain other advantages. The advantage of imprecise ant mimics may not be restricted to the microhabitat in which a specific model species is found. All the three mimics *M. orientales*, *M. Maratha* and *M. plataleoides* (Tikader, 1972 a), were observed to have color variations.

The following variation were studied in *Myrmachne orientales* (Tikader, 1972 a)- cephalic region was dark black in color, chelicerae were smaller than cephalothorex and straight fangs with a projection at the start. Females were observed to be smaller as compared to males. In the same way male *Myrmachne maratha* (Tikader, 1972 a), were black in color and if chelicerae of males are excluded then females are larger in size as compared to male. Eyes are not encircled with black patch. Fangs with a prominent projection in the middle, large teeth and abdomen is without a prominent constriction in males. Similarly the females especially of *Myrmachne plataleoides* (Tikader, 1972 a), mimic the Weaver ant (*Oecophylla smaragdina*) but males and females were black in color and chelicerae at the end had a bulb like structure having warts. It is thought that males are more conspicuous in their color markings than related species that have evolved cryptic coloration (Cushing 2012). Fangs were uniform up to middle and then highly curved with very small sized teeth. Variation in male form, ranging from accurate to imprecise mimicry is helping the *Myrmachne* mimic to live in the area where seven different types of model species of ant are found.

Three Batesian mimic of.....Sharma, V.K.

The above study emphasizes two important feature of mimicry. First is the in most of the cases number of model needs to considerably outnumber the mimic, otherwise the benefits of the mimic will be eliminate and secondly the polymorphism in mimic helps them to survive in a multi species population of host.

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